

# Monitoring of engine oils and lubricants using IR spectrometry

**ASTM E2412 – 10(2018)** Standard Practice for Condition Monitoring of In-Service Lubricants by Trend Analysis Using Fourier Transform Infrared (FT-IR) Spectrometry

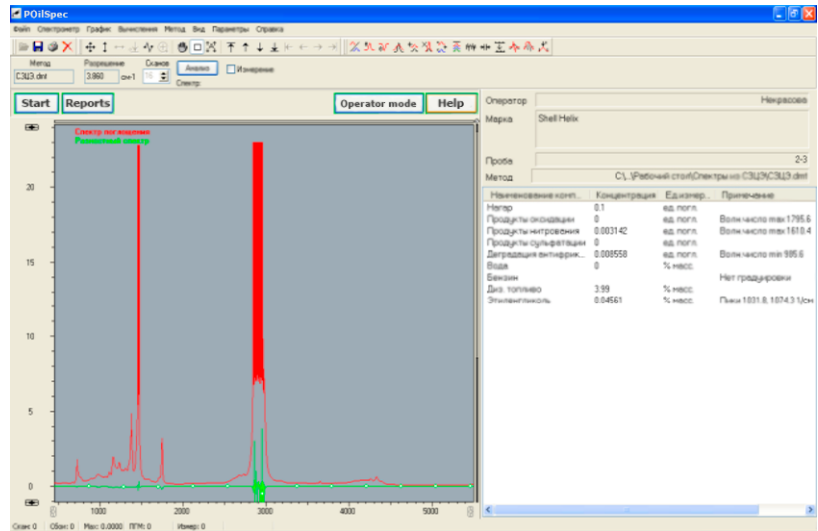
The method of differential IR Fourier Spectrometry (analysis of working oil sample spectra as compared to the new oil sample spectra) allows to quickly control the state of engine oils in the process of operation.

Oils change their properties under the influence of loads, high temperatures and as a result of equipment wear – there is a depletion of additives, oxidation of basic components, water and fuel pollution, the accumulation of nitrogen and sulfur oxides. Negative changes in operating parameters of oils and greases lead to equipment failures.

**IROS P01** IR Fourier spectrometer with liquid cell and **POilSpec** software, with built-in graduation, allows to perform express analysis of working oil samples according to **ASTM E2412 – 10** standard.

The **POilSpec** software with an interactive interface controls the entire analysis process:

- graduations calculation according to the specific parameters of the working oil;
- spectra registration of a comparison sample and a working oil sample;
- spectral data processing with automatic calculation of oil parameters;
- data archiving and printout of the measurement protocol.



**POilSpec** software. Engine oil parameter monitoring

Defined parameters of engine oils

Parameter	Spectral range, cm <sup>-1</sup>
Ethylene glycol	1 100 – 1 030
Water	3 500 – 3 150
Fuel (diesel)	815 – 805
Fuel (gasoline)	755 – 745
Nitrogen oxides	1 650 – 1 600
Sulfated products	1 180 – 1 120
Oxidation products	1 800 – 1 670
Soot products	2 000
Additive components	1 025 – 960

## Features

- Automation of measurements, including the functions of initial testing and self-diagnostics during operation of the spectrometer
- Automatic calculation of oil parameters from the built-in calibration model

## Specification and technical data

### IROS P01 IR Fourier spectrometer

- Self-compensating Mickelson interferometer, no dynamic alignment required, gold plated mirrors
- Sealed placement of optical elements
- Waterproof design of the beam splitter and KBr optical windows
- Large-sized cell compartment

Spectral range	7 800 – 370 cm <sup>-1</sup>
Spectral resolution	1.0 cm <sup>-1</sup>
Cell compartment dimensions, mm	200 × 190 × 170
Dimensions, mm	520 × 370 × 250
Weight, kg	28

### Cells and accessories

- Demountable cell for liquid samples with spacer set
- Window material – KBr. Optical path length – 0.1; 0.2; 0.3; 0.5; 0.8 mm.
- Easy assembly-disassembly of the cell, quick replacement of windows and spacers
- Minimum sample volume – 0.2 ml
- Syringe for filling the cell with sample

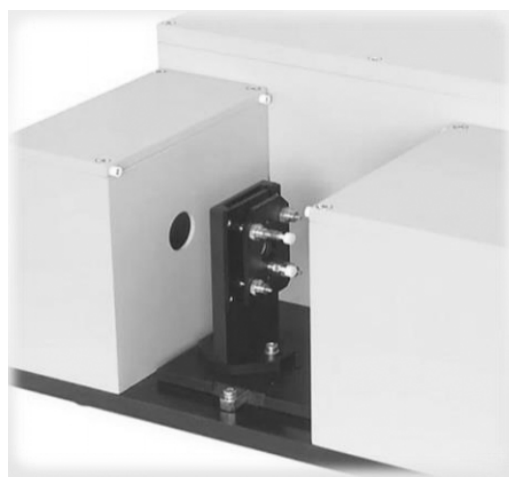
### Software

**PFSpec** is a basic software for **IROS P** series FTIR spectrometers.

Obtaining, analysis and processing of spectra, spectrometer testing. Windows XP/Vista/7/10 compatible.

**POilSpec** is a software for monitoring the condition of oils in operation.

Automatic calculation of oil parameters by the built-in calibration model.



*IROS P01 FTIR spectrometer*

*#52298-12 in the State Register of Measuring Instruments of the Russian Federation*